

I. *A true Copy of a Paper found, in the Hand Writing of Sir Isaac Newton, among the Papers of the late Dr. Halley, containing a Description of an Instrument for observing the Moon's Distance from the Fixt Stars at Sea.*

Read at a Meeting of the Royal Society, October 28. 1742.

IN the annexed Scheme, *PQRS* denotes a Plate of Brass, accurately divided in the Limb *DQ*, into $\frac{1}{2}$ Degrees, $\frac{1}{2}$ Minutes, and $\frac{1}{12}$ Minutes, by a Diagonal Scale; and the $\frac{1}{2}$ Degrees, and $\frac{1}{2}$ Minutes, and $\frac{1}{12}$ Minutes, counted for Degrees, Minutes, and $\frac{1}{6}$ Minutes.

AB, is a Telescope, three or four Feet long, fixt on the Edge of that Brass Plate.

G, is a *Speculum*, fixt on the said Brass Plate perpendicularly, as near as may be to the Object-glass of the Telescope, so as to be inclined 45 Degrees to the Axis of the Telescope, and intercept half the Light which would otherwise come through the Telescope to the Eye.

CD, is a moveable Index, turning about the Centre *C*, and, with its fiducial Edge, shewing the Degrees, Minutes, and $\frac{1}{6}$ Minutes, on the Limb of the Brass Plate *PQ*; the Centre *C*, must be over-against the Middle of the *Speculum G*.

H, is another *Speculum*, parallel to the former, when the fiducial Edge of the Index falls on *oo* *oo'* *oo''*; so that the same Star may then appear through

the Telescope, in one and the same Place, both by the direct Rays and by the reflex'd ones; but if the Index be turned, the Star shall appear in two Places, whose Distance is shewed, on the Brass Limb, by the Index.

By this Instrument, the Distance of the Moon from any Fixt Star is thus observed: View the Star through the Perspicil by the direct Light, and the Moon by the Reflex (or on the contrary); and turn the Index till the Star touch the Limb of the Moon, and the Index shall shew upon the Brass Limb of the Instrument, the Distance of the Star from the Limb of the Moon; and though the Instrument shake, by the Motion of your Ship at Sea, yet the Moon and Star will move together, as if they did really touch one another in the Heavens; so that an Observation may be made as exactly at Sea as at Land.

And by the same Instrument, may be observed, exactly, the Altitudes of the Moon and Stars, by bringing them to the Horizon; and thereby the Latitude, and Times of Observations, may be determined more exactly than by the Ways now in Use.

In the Time of the Observation, if the Instrument move angularly about the Axis of the Telescope, the Star will move in a Tangent of the Moon's Limb, or of the Horizon; but the Observation may notwithstanding be made exactly, by noting when the Line, described by the Star, is a Tangent to the Moon's Limb, or to the Horizon.

To make the Instrument useful, the Telescope ought to take in a large Angle: And to make the Observation true, let the Star touch the Moon's Limb, not on the Outside of the Limb, but on the Inside.

see p. 155.

